

Applicant: Vesa Ahvenniemi et al.
Application No.: 10/533,333
Response to Office action dated Oct. 19, 2007
Response filed December 12, 2007

Claim Listing

1-10. (cancelled)

11. (currently amended) A paper machine incorporating on line finishing, and defining an upstream direction and a downstream direction wherein a paper web formed on the paper machine is arranged to travel in the downstream direction, comprising:

at least one finishing stage arranged within the paper machine for finishing a paper web produced on the paper machine, the at least one finishing stage having a downstream end;

cutting equipment ~~positioned upstream of~~ arranged within the finishing stage, the cutting equipment arranged to form a tail from a full width paper web;

tail threading equipment extending from the cutting equipment through the at least one finishing stage, and

a single-contact draw point formed of only a single dryer cylinder and a single drying wire wrapping an upper portion of the single dryer cylinder, the single drying cylinder and single drying wire forming a path to broke treatment after the single drying wire leaves the single dryer cylinder, the single-contact draw point arranged to tension and hold a paper web between one cylinder and a wire arranged in contact with the one cylinder, the single-contact draw point arranged at the downstream end of the finishing stage and downstream of the cutting equipment; and

~~wherein the tail threading equipment includes a carrier rope system passing through the single-contact draw point.~~

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12. (currently amended) A paper machine incorporating on line finishing, and defining an upstream direction and a downstream direction wherein a paper web formed on the paper machine is arranged to travel in the downstream direction, comprising:

at least one finishing stage arranged within the paper machine for finishing a paper web produced on the paper machine, the at least one finishing stage having a downstream end;

cutting equipment arranged within the finishing stage, the cutting equipment arranged to form a tail from a full width paper web;

tail threading equipment extending from the cutting equipment through the at least one finishing stage, and

a single-contact draw point formed between one cylinder and a wire arranged in contact with the one cylinder, the single-contact draw point arranged at the downstream end of the finishing stage and downstream of the cutting equipment;

wherein the tail threading equipment includes a carrier rope system passing through the single-contact draw point; ~~The paper machine of claim 11;~~

wherein the at least one finishing stage has equipment changing selected properties of the paper a selected amount, positioned upstream of the single-contact draw point and further comprises:

measuring elements forming part of the finishing stage positioned upstream of the single-contact draw point and downstream of the equipment changing the properties of the paper a selected amount, the measuring elements arranged for measuring the selected properties of the paper.

13. (previously presented) The paper machine of claim 11 wherein the cutting equipment is composed of water cutters that are positioned over an open draw in the paper machine.

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14. (previously presented) The paper machine of claim 11, wherein a wrap angle of 100° – 160° is defined by the wire on the periphery of the cylinder.

15. (currently amended) The paper machine of claim 11, wherein the tail threading equipment includes a carrier rope system passing through the single-contact draw point and wherein in addition to the carrier rope system the tail threading equipment includes at least one vacuum belt.

16. (previously presented) The paper machine of claim 11, wherein the cylinder is a dryer cylinder.

17. (previously presented) The paper machine of claim 11, wherein the wire is a dryer wire.

18. (previously presented) The paper machine of claim 11, wherein the wire is supported and driven by a lead roll connected to a drive.

19. (previously presented) The paper machine of claim 18, wherein, in addition to the lead roll, the wire forming an endless loop is supported with three additional rolls.

20. (previously presented) The paper machine of claim 18, wherein the cylinder has an auxiliary drive, which is arranged to follow the drive of the lead roll.

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21. (currently amended) A paper machine having a dryer section and incorporating on line finishing, the paper machine defining an upstream direction and a downstream direction, wherein a paper web formed on the paper machine is arranged to travel in the downstream direction, comprising:

at least one finishing stage forming part of the paper machine downstream of the dryer section for finishing the paper web produced on the paper machine, the at least one finishing stage having a downstream end;

cutting equipment ~~positioned upstream of~~ arranged within the finishing stage, the cutting equipment arranged to form a tail from a full width paper web;

a single-contact draw point formed between one cylinder and a wire arranged in contact with the one cylinder, the single-contact draw point arranged at the downstream end of the finishing stage and downstream of the cutting equipment; and

tail threading equipment extending from the cutting equipment to a carrier rope system passing through the single-contact draw point;

wherein the at least one finishing stage has equipment for changing selected properties of the paper a selected amount, the equipment positioned upstream of the single-contact draw point, the paper machine further comprising:

measuring elements forming part of the finishing stage positioned upstream of the single-contact draw point and downstream of the equipment changing the properties of the paper a selected amount, the measuring elements arranged for measuring the selected properties of the paper;

a controller in data receiving relation to the measuring elements, and in controlling relation to the equipment changing the selected properties of the paper a selected amount; and

wherein the first finishing stage is arranged so that the equipment changing the properties of the paper a selected amount can be adjusted to selected production settings while running a full width web.

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22-24. (canceled)

25. (previously presented) The paper machine of claim 21, wherein in addition to the carrier rope system the tail threading equipment includes at least one vacuum belt.

26. (previously presented) The paper machine of claim 21, wherein the cylinder is a dryer cylinder.

27. (previously presented) The paper machine of claim 21, wherein the wire is a dryer wire.

28. (previously presented) The paper machine of claim 21, wherein the wire is supported and driven by a lead roll connected to a drive.

29. (previously presented) The paper machine of claim 28, wherein, in addition to the lead roll, the wire forming an endless loop is supported with three additional rolls.

30. (previously presented) The paper machine of claim 28, wherein the cylinder has an auxiliary drive, which is arranged to follow the drive of the lead roll.

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31. (currently amended) A paper machine incorporating on line finishing, comprising:

a paper machine having a dryer section;

a first finishing stage, positioned after the dryer section, the first finishing stage comprising: a precalender followed by a first cutting equipment positioned within a first open draw leading in to a first draw point, the first draw point comprising: only a single dryer cylinder and a single drying wire wrapping an upper portion of the single dryer cylinder, the single drying cylinder and single drying wire forming a path to broke treatment after the single drying wire leaves the single dryer cylinder, the first draw point arranged to tension and hold a paper web;

~~in the first finishing stage, prior to the draw point, and after the precalender, a plurality of measuring elements, of the type which measure at least one specific paper property and are arranged to measure a paper web before the first draw point;~~

wherein the first finishing stage is arranged so that the precalender can be adjusted to selected production settings while running a full width web; and

a second finishing stage positioned after the first finishing stage, the second finishing stage comprising: a coater followed by a second cutting equipment positioned within a second open draw leading in to a second draw point, the second draw point comprising: only a single dryer cylinder and a single drying wire wrapping an upper portion of the single dryer cylinder, the single drying cylinder and single drying wire forming a path to broke treatment after the single drying wire leaves the single dryer cylinder, the second draw point arranged to tension and hold a paper web in the second finishing stage;

~~prior to the second draw point, a plurality of measuring elements, of the type which measure at least one specific paper property and are arranged to measure a paper web before the second draw point; and~~

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wherein the second finishing stage is arranged so that the coater can be adjusted to selected production settings while running a full with web.

32. (currently amended) The apparatus of claim ~~[[22]]~~ 31, wherein the first cutting equipment is a water cutter.

33. (currently amended) The apparatus of claim ~~[[22]]~~ 31, wherein the second cutting equipment is a water cutter.

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34. (currently amended) A method of on-line finishing in a paper machine, comprising the steps of:

- after a drying section which ends actual production of a paper web on the paper machine, forming a first tail from the paper web and threading the first tail through a precalender in a first finishing stage, the first finishing stage tensioning and holding the paper web with a first draw point formed between a single dryer roll and a single drying wire which holds the paper web between the single dryer wire and the single dryer roll which is the only drawing point between the pre-calendar and a broke treatment immediately after the first draw point ~~the first draw point~~;
- spreading the first tail to a full width web in the precalender;
- precalendering the paper web in the precalender;
- determining selected paper web properties at or prior to the first draw point;
- setting the precalender to production settings based on the determined paper web properties;
- in the first finishing stage, until the precalender is set to the production settings, guiding the paper web to the broke treatment immediately after the first draw point;
- following setting the precalender to production settings, forming a second tail from the paper web in an open draw leading into the first drawing point and threading the second tail through a coater in a second finishing stage, the second finishing stage tensioning and holding the paper web with a second draw point formed between a single dryer roll and a single drying wire which holds the paper web between the single dryer wire and the single dryer roll which is the only draw point between the coater and a broke treatment immediately after the second draw point ~~the second draw point~~;
- spreading the second tail to a full width web in the coater;
- coating the paper web in the coater to form a coated paper web;

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determining selected coated paper web properties at or prior to the second draw point;
setting the coater to production settings based on the determined coated paper web properties;
in the second finishing stage, until the coater is set to the production settings, guiding the coated paper web to the broke treatment immediately after the second draw point; and
reeling the coated paper web.

35. (previously presented) The method of claim 34, further comprising the steps of:

following setting the coater to production settings, and before reeling the paper web, forming a third tail from the paper web and threading the third tail through a calender, forming a third finishing stage end;
spreading the third tail to a full width web in the calender;
calendering the paper web in the calender; and
setting the calender to production settings, followed by the step of reeling the paper web.

36. (previously presented) The method of claim 34, further comprising the step of changing properties of at least one of the first tail and the second tail, while forming said first tail and said second tail, so as to ensure successful threading of at least one of the first tail and the second tail.

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37. (currently amended) A paper machine incorporating on line finishing, comprising:

after a dryer section a precalendering finishing stage, having a precalender;
after the precalendering finishing stage a coating finishing stage, having a coater;
after the coating finishing stage a reeling stage;
wherein the precalendering finishing stage and the coating finishing stage each has a draw point having only a single dryer cylinder wrapped by only a single drying wire, which is arranged to draw a paper web through each finishing stage;
wherein each draw point defines an open draw leading in to the draw point and a point leading to broke treatment equipment;
a cutting equipment positioned within each open draw for forming a tail from a fully wide paper web; and
~~measuring elements, of the type which measure at least one specific paper property and are arranged to measure a paper web before each draw point, and after the precalender or the coater.~~

38. (new) The paper machine of claim 37 further comprising measuring elements, of the type which measure at least one specific paper property and are arranged to measure a paper web before each draw point, and after the precalender or the coater.

39. (new) The apparatus of claim 31 further comprising, in the first finishing stage, prior to the draw point, and after the precalender, a plurality of measuring elements, of the type which measure at least one specific paper property and are arranged to measure a paper web before the first draw point; and
prior to the second draw point, a plurality of measuring elements, of the type which measure at least one specific paper property and are arranged to measure a paper web before the second draw point.

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40. (new) The paper machine of claim 21, wherein a wrap angle of 100° – 160° is defined by the wire on the periphery of the cylinder.